

# Mohammed Rayan

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## About Me

Robotics and Embedded Systems Developer with hands-on experience in real-time autonomy, ROS2, and AI-powered automation. I build scalable systems using Jetson, Raspberry Pi, and microcontrollers with SLAM, PPO, and sensor fusion. Currently leading research in hybrid control (PID + PPO) and actively contributing to robotics innovation through IEEE and EV racing projects.

## Education

### B.E. in Electronics Engineering (2nd Year)

M S Ramaiah Institute of Technology, Bangalore  
CGPA: 8.4

2023 – 2027

### 12th Grade – Sir M.V PU College

Percentage: 93.5%

### 10th Grade – Sri Mahaveer Vidyalaya

Percentage: 96.6%

## Skills

**Programming:** C, C++, Python, MATLAB

**Embedded Systems:** Arduino, STM32, ESP32, Raspberry Pi, NVIDIA Jetson

**Robotics/AI:** ROS2, SLAM (RTAB-Map, AMCL), Nav2, PPO, Path Planning

**Tools & Libraries:** Git, VS Code, Linux, Flask, Gymnasium, TensorFlow Lite, scikit-learn

**Sensors:** Lidar, Depth Camera, IMU, Gas, Current/Voltage, Motor Drivers

## Technical Projects

### Smart Power Home Automation System (CAPE)

- Developed IoT system for real-time power tracking, automated billing, and AI-based predictive maintenance.
- Reduced testbed energy usage by 20% using sensor-driven analytics and fault detection.
- Tools: Arduino, Raspberry Pi, Flask, LightGBM, Sensors
- Best Hardware Project – Ignitex, BGSIT

### AURORA – Autonomous Mobile Robot (AMR) (Ongoing)

- Designed and built logistics AMR using ROS2, RTAB-Map SLAM, and Nav2 stack on Raspberry Pi 5.
- Implemented obstacle avoidance, global path planning, and sensor fusion (IMU + Lidar).
- Tools: ROS2 Humble, 2D Lidar, IMU, Flask UI
- Currently integrating into full SLAM-based Gazebo simulation.

### Self-Balancing Robot with Reinforcement Learning (PPO)

- Developed hybrid control robot using classical PID and PPO reinforcement learning.
- Trained PPO agent on real-world sensor-action dataset from MPU6050 via Arduino.
- Tools: Stable-Baselines3, Gymnasium, Arduino, Python

### AI-Powered Corrosion Monitoring System

- Built a real-time corrosion monitoring platform using AD5933 with Raspberry Pi.
- Logged and visualized impedance data for early warning; future-ready for ML prediction + LoRa.
- Tools: AD5933, Python, ThingSpeak, TensorFlow Lite (planned)

## Positions of Responsibility

### Vice Technical Head – IEEE Sensors Council, RIT-B

2024 – Present

- Organized RoboSoccer event featuring 4 custom-built bots using nRF modules.
- Designed and prototyped bots for the “SensoryBot” robotics hardware competition with 30+ participants.

- Designed circuits on Tinkercad for “Breakpoint” hardware debugging challenge
- Leading development of a thermal anomaly detection drone using IR sensors and sensor fusion.

**Electrical Subsystem Member – Team Volante (EV Club)****2025 – Present**

- Designed LV shutdown and TSAL (Tractive System Active Light) circuits for EV go-kart.
- Implemented safe power distribution with emergency interlocks for race compliance.
- Developed sensor supply design for onboard electronics reliability during racing conditions.

**Research****PID vs PPO for Real-Time Self-Balancing Robots***Under Dr. Shivprakash G, HOD, RIT-B (Ongoing)*

- Investigating hybrid control using classical PID and PPO-based reinforcement learning.
- Collected training data using MPU6050 + BTS7960 with Raspberry Pi + Arduino.
- Implementing PPO agent for real-time physical balancing on embedded system.
- Preparing submission to IEEE Access / RA-L journal in 2025.

**Awards**

- **Best Hardware Project** – Ignitex, BGSIT (**Apr 2025**)
- **Best Technical Bot Design** – RoboSoccer @ DSU × MIT Square (**Apr 2025**)